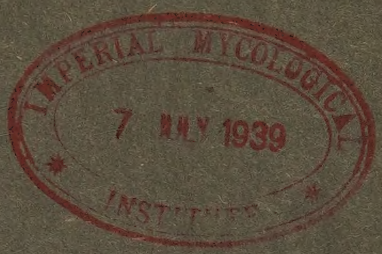
British West Indies Central Sugar Cane Breeding Station, Barbados.



FIFTH ANNUAL REPORT

ENDING SEPTEMBER 30, 1938.

Advocate Co., Ltd.,—Printers to the Government of Barbados.

British West Indies Central Sugar Cane Breeding Station, Barbados.

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BRITISH WEST INDIES SUGAR CANE BREEDING STATION.

ADVISORY COMMITTEE.

Chairman—S. J. Saint, M.Sc., Ph.D. F.I.C. (London), Director of Agriculture, Barbados.

Members—Sir Geoffrey Evans, Kt., M.A., C.I.E., Principal of the Imperial College of Tropical Agriculture, Trinidad.

Hon. E. J. Wortley, C.M.G., O.B.E., Director of Agriculture, Trinidad.

Hon. A. C. Barnes, C.M.G., B.Sc., F.I.C., A.M.I.Ch.E., Director of Agriculture, Jamaica.

G. A. Jones, Dip. Agric., (Bangor), Commissioner of Agriculture of the Agricultural Advisory Department of the Imperial College of Tropical Agriculture, Trinidad.

Geneticist—A. E. S. McIntosh, B.Sc., Ph.D. (Edin.)

Assistant Botanist—G. C. Stevenson, B.A., A.I.C.T.A.

Agricultural Assistant—A. D. Herbert, D.I.C.T.A.

„ „ —J. N. W. Niccolls.

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I. FOREWORD.

FINANCIAL.

The year under review is the first year in which the entire £2,000, deemed necessary in 1932 for the extension of sugar cane breeding in Barbados to cope with the seedling requirements of the British West Indies, has been paid by the colonies served by this Station.

A review of the financial position of the Station given at the seventh meeting of the Advisory Committee held in Trinidad in 1938, clearly showed that this annual contribution of £2,000 was insufficient for the proper functioning of the Station and it was considered that an increased subscription of £500 per annum was necessary. To meet this, Trinidad and Jamaica were asked to increase their subscriptions by £200 and £300 respectively. At the moment of writing, it is gratifying to record that there is every possibility of payment of these increases being agreed to by the colonies concerned.

Visits.

Owing to lack of travelling funds no visits by technical officers of the Station to contributing colonies were possible. With the anticipated payment of increased subscriptions noted above this is not likely to recur in future years.

Technical.

During the season, the routine breeding and seedling selection work progressed very favourably. It was necessary, however, to suspend the investigations into cane rotting and seedling ratooning on account of the transfer of the Assistant Botanist to Mauritius during the 1938 crop. A new Assistant Botanist has been appointed and will assume duties on the 1st October. The full programme of investigational work will then be resumed.

It is to be noted that very few nobilised seedling selections were despatched to the Plant Quarantine Station during the year. This is accounted for by the fact that with the change in seedling testing policy, no first year seedlings were reaped in 1936 and therefore no second year nobilised seedling trials were conducted during the season 1936-38.

The starting of mosiac disease resistance testing in Barbados represents a very important new line of special work. It is anticipated that this work will lead to a greater efficiency in the selection of seedlings for Jamaica.

Of the seedlings sent out to the contributing colonies prior to the opening of the Plant Quarantine Station, both B.726 and more especially B.2935 have become established as commercial varieties. The first batch of the Station's seedlings to be liberated by the Plant Quarantine Station are now undergoing test in some of the Islands and plant cane results will be available during the 1939 crop.

A resolution made by planters' representatives at a meeting of the Varieties Committee of the Sugar Cane Investigation Committee of Trinidad during the seventh meeting of the Advisory Committee shows the great appreciation of the work of the Station shown by the cane growers in Trinidad.

Personnel.

The resignation of Sir Geoffrey Evans from the Principalship of the Imperial College of Tropical Agriculture renders a vacancy on the Advisory Committee. Sir Geoffrey was a member of the Advisory Committee from the inception of the Station in 1932 and through his keen enthusiasm for co-operation in agricultural research in the British West Indies and his invaluable advice throughout rendered great service to the Station. It is desired to record appreciation of these services.

Congratulations are due to Mr. G. A. Jones, formerly representative on the Advisory Committee for the Windward and Leeward Islands, on his appointment as Director of Science and Agriculture in Jamaica. It is fortunate that the Advisory Committee will still retain his services as the representative for Jamaica.

In March of the year under review, Mr. G. C. Stevenson, Assistant Botanist, left the Station to take up his new appointment as Botanist and Mycologist to the Sugar Cane Research Station in Mauritius. Mr. Stevenson joined the staff of the Station in 1932 as Assistant Botanist and in addition to assisting in the work of seedling breeding and testing undertook special investigational work, more particularly on sugar cane root system development, on gumming disease and investigations into the use of the Zeiss Hand Refractometer. It is desired to record here appreciation of Mr. Stevenson's valuable work.

S. J. SAINT,
Director of Agriculture,
Barbados,
Chairman of Advisory Committee.

British West Indies Central Sugar Cane Breeding Station

REPORT FOR THE YEAR ENDING SEPTEMBER 30, 1938.

II. SUGAR CANE BREEDING. SEEDLING SELECTION AND TRIALS.

(1) SUGAR CANE BREEDING—B.40′ SERIES.

Sugar cane breeding was carried out at Lion Castle from October to December, 1937.

All breeding work consisted in crossing. The majority of the crossing was made, as in previous years, in lanterns. In addition, an attempt was made to effect crossing by the Hawaiian method. Results of both methods are given here.

(a) *Lantern method.* In all, sixty-two crosses were made. Seedlings from these were, as usual, raised in boxes, then in pots, and finally planted into a field nursery. A summary of the numbers dealt with at the various stages is given below. Details are presented in Appendix I.

Group	No. of Crosses	No. of Germinations (Nov.-Dec. 1937)	No. Potted (Jan.-Feb. 1938)	No. Planted in Field Nursery (April, 1938)
Proven Crosses (*Saccharum officinarum*)	4	12,797	6,492	4,841
Semi-Proven Crosses (*S. officinarum*) ..	4	1,681	945	558
Experimental Crosses. Nobilisations.				
(a) *S. spontaneum* (i) Celebes ..	3	173	94	81
(ii) India	1	590	389	366
(iii) Java	26	17,563	8,339	5,982
(b) *S. barberi*	2	393	279	246
(c) *S. sinense*	7	29	13	9
(d) Crosses involving more than two species of *Saccharum* ..	15	5,486	3,608	3,096
TOTAL	62	38,712	20,159	15,179

The season was noted as one favouring scanty arrowing. Several intended crosses could not therefore be made: this especially for some noble varieties. Also, germinations were lower than usual.

Of the crosses proving fertile, the following are of interest:—B. 3439 x B.H.10(12)—a noble cross, B.3013 x B.35251—a second nobilisation of the Indian *S. spontaneum,* using as female parent the new commercial noble seedling, B.3013, and Co.213 x B.603.

The last named is interesting in that it proved comparatively fertile where previously Co.213 crossed with noble canes has proved of very low fertility, or even infertile.

(b) *Hawaiian method.* An experiment was made to test the efficacy of this method under Barbados conditions. This test is reported here.

INTRODUCTORY.

The Hawaiian method of sugar cane breeding consists essentially in the use, for hybridisation, of arrowing canes severed from the stools and preserved by immersing their bases in a solution of sulphurous acid and phosphoric acid. Details of the method were kindly supplied by Mr. A. J. Mangelsdorf, Geneticist, of the Experimental Station of the Hawaiian Sugar Planters' Association, and the method was tested under Barbados conditions during the breeding season 1937.

THE METHOD.

Arrowing canes were cut from the breeding plots at Lion Castle, the canes being taken complete from the stools. Immediately prior to their being placed in the solution, their bases were trimmed to reveal a clean surface, and in such a way that the total length of cane and arrow was from six to nine feet. The two or three uppermost leaves only were left on the canes. Female varieties were cut when the uppermost flowers were about to open, and males immediately after flowering had commenced. Individual crosses consisted of from three to five female arrows, according to the size of the arrows, and from five to seven male arrows. The arrows were so arranged in the containers that the males were intermingled with, and slightly above, the females. Except where the same male parent was used in adjacent crosses, the containers were placed at a sufficient distance apart to minimise any possibility of interference between the crosses by pollen drifting from one cross to another.

The crossing work was carried out in the disused boiling house at Highland Plantation (adjacent to Lion Castle Plantation), where plenty of room was available, though the light intensity was of necessity somewhat less than in the open.

Each morning the male arrows were shaken gently to liberate the pollen and allow it to fall on to the female arrows.

The preservative solution was made up in rain water, and consisted of 0.01 per cent. sulphurous acid and 0.01 per cent. phosphoric acid, as used in the Hawaiian work. In actual practice, the solution was prepared immediately prior to use by diluting a stock solution consisting of 0.1 per cent. sulphurous acid and 0.1 per cent. phosphoric acid, to the requisite degree.

The containers were galvanised buckets, of 4 — 5 gallons capacity, painted internally with "ferrodor," an acid-resisting paint.

The male arrows were removed after flowering had finished, and the females left until the fuzz was apparently mature, and beginning to fall from the uppermost spikelets.

The preservative solution was changed three times a week, until the female arrows were collected.

The fuzz stripped from the female arrows was sown after drying for three days, as is the practice with fuzz from the routine "lantern" crosses.

Fourteen crosses, selected to represent a wide range in parental types and involving various combinations of the blood of *Saccharum officinarum, S. spontaneum, S. barberi* and *S. sinense,* were made.

OBSERVATIONS.

Varieties differed considerably in their behaviour under experimental conditions. Certain varieties remained normal in appearance and flowered satisfactorily, whilst others died within a few days, and dropped their fuzz.

Varieties in which the arrows emerge fully from the sheaths before flowering commences, appeared to be more satisfactory than those which flower at the top during emergence. In the latter type of variety, growth was small after cutting the canes, and the arrows failed to emerge fully. Flowering and pollen shedding appeared to be normal in most male varieties for 5 — 8 days, after which little pollen was shed and the arrows began to lose their fuzz.

The leaves of all varieties changed from green to yellow while still turgid and fully expanded. This colour change occurred in some varieties after 3 — 4 days, whilst in others the leaves remained green and fresh for 10 — 12 days. Subsequently the leaves become brown and dry in all varieties.

Female varieties in general appeared to flower satisfactorily, except in cases where arrow emergence and flowering normally occur together.

The period between flowering and fuzz shedding was in all cases considerably shorter than in growing canes, for which records are available from the routine "lantern" breeding scheme.

RESULTS.

In all cases the fuzz failed to germinate, and the method was a complete failure. Although pollination would appear to have been successfully accomplished in most cases, it appears that the arrows were not kept alive for a sufficient time for fuzz maturation to take place.

All the crosses carried out by the Hawaiian method were duplicated in the routine "lantern" programme, and normal germinations obtained.

POSSIBLE REASONS FOR FAILURE.

1. Barbados conditions may be unsuitable for the method, due to too low a humidity.
2. The preservative solution may have been too weak or too strong for Barbados conditions.
3. The acid-resisting paint did not adhere satisfactorily to the buckets, and some acid may have been lost through its action on the metal in some cases, though this could hardly account for *total* failure. Earthenware containers might be tried in future.
4. The light intensity in the building may have been too low.

A copy of this report was sent to Mr. Mangelsdorf who replied *inter alia* as follows:—

"..... We had much the same experience as yourself in 1928 when we "set up our crosses in empty buildings in the Territorial Fair Grounds. "Much to our surprise the crosses set up in the open in full sunlight "succeeded much better than those which had been set up under the "protection of the buildings. It would seem that the tassels react un- "favourably to the lower humidity within the buildings, or that they "require direct sunlight to mature properly.....".

During the coming season it is the intention to repeat the method in a nearby gully where humidities are higher and the arrows exposed to full daylight intensity and sheltered from the wind.

(II) PLANTING THE FIRST YEAR SEEDLING TRIAL—B.39' SERIES.

These seedlings were bred in 1936, planted into a field nursery in April/May, 1937, and selections from the nursery planted in the First Year Seedling Trial in October/November, 1937. Details of these plantings are given in Appendix II. A summary is given here:—

Group.	Number of Crosses	No. in Field Nursery	No. Planted in First Year Seedling Trial
Proven Crosses. *(Saccharum officinarum)*	6	7,743	4,315
Semi-Proven Crosses. *(Saccharum officinarum)*	5	1,880	695
Experimental Crosses Nobilisations			
(a) *S. spontaneum, India*	3	386	245
(b) *S. spontaneum,* Celebes	4	326	147
(c) *S. spontaneum,* Java	26	2,145	1,247
(d) *S. barberi*	4	520	268
(e) *S. sinense*	3	60	30
(f) Mixed derivation	12	1,423	834
(g) Control cross— Ba. 11569 x B.H. 10(12)	(1)	—	156
Totals	63	14,483	7,937

It can be seen that almost fifty per cent. of the nursery seedlings were eliminated. The features used in elimination were obvious ones such as marked lack of vigour, possession of very thin canes, arrowing. The nursery stage undoubtedly serves to promote greater efficiency in the seedling selection work.

During planting, notes were made on the appearance of the individual cross populations.

In planting the First Year Trial, the populations of proven, semi-proven noble crosses, proven nobilised crosses and early nobilised crosses were planted in blocks. The last named are so planted so that a selection of seedlings for further breeding work may be made. The remaining seedlings were distributed purely at random in the experimental cross block. This lay-out serves to provide legitimate comparison between experimental cross populations and also to admit of selections for commercial test. Seedlings of Dacca were planted for the first time. The nobilisation of Java *S. spontaneum* has reached the sixth degree, and the populations possess noble cane appearance. It is interesting to note that nobilisations of the fourth degree in this group have been tested and found commercially resistant to mosaic. It appears to be highly probable that noble-like seedlings will be obtained with commercial resistance to the disease.

(III) RESULTS OF REAPING THE FIRST YEAR SEEDLING TRIAL—B.38′ SERIES.

These were bred in 1935, planted into a field nursery and from this into the First Year Trial in 1936.

The lay-out adopted was similar to that used with seedlings of the preceding series.

In considering the results, the various categories are considered separately.

(a). *Proven and Semi-Proven Crosses.* As usual, these were reaped, one lot early in crop and the other late.

Selections were as follows:—

(1) EARLY GROUP.

Cross.	No. Selected in Field	No. Finally Selected
Ba. 11569 x B. 417	44	21
,, x B.6835	26	15
,, x S.C. 12/4	30	7
,, x Burke	13	1
,, x Q. 813	8	2
,, x Ba. 8069	7	3
,, x D. 625	7	1
Bourbon x B. 2935	1	1
B. 3138 x B. 2935	3	1
Totals	139	52

(2) LATE GROUP.

Cross.	No. Selected in Field	No. Finally Selected
Ba. 11569 x B.H.10(12)	24	10
„ x B. 694	14	5
„ x D. 625	5	1
„ x Badila	14	3
„ x B. 693	36	11
„ x B. 603	14	8
„ x E. K. 28	8	4
B. 3013 x B.H.10(12)	5	2
B. 3138 x B. 2935	3	2
Bourbon x B.H.10(12)	1	1
Totals	124	47

The best crosses were:—

Ba. 11569 x B. 417
„ x B. H. 10(12)
„ x B. 693
„ x B. 603
„ x E. K. 28

(b) *Experimental Crosses*: These totalled 3,700 seedlings derived from forty-three crosses. These consisted chiefly of Java *glagah* and *chunnee* nobilisations, while some were of mixed derivation.

They were reaped about mid-crop and the usual field data obtained for purposes of field selection. In all 121 seedlings were finally selected and planted in multiplication plots.

For purposes of comparison between the various crosses being tested, tables of field and final selections were prepared. In addition, an exhaustive statistical analysis was made for each of the important selection characters. This is done in order to guide the future nobilisation work.

(c) *Early nobilisations.*

These were:—

Synthetic Kassoer	x	B. 2935
Ba. 11569	x	Dacca
Uba	x	P.O.J. 2878
B. 3215	x	*Sacc. spontaneum*
Ba. 11569	x	Dacca
Uba	x	B. 603
Kassoer	x	B. 6835

The seedling populations of these were grown in blocks and selections made at reaping to serve as parents in further nobilisation. In all, sixteen were selected for this purpose.

(IV) MULTIPLICATION AND MINOR SELECTION PLOTS, AND GUMMING DISEASE RESISTANCE TESTS—B.37′ SERIES.

These concern seedlings selected from the First Year Trial of 1937. Two groups are recognised:—

(a) *Noble canes.* There were 113 of these. After selection, they were multiplied at Codrington Experiment Station.

During November, 1937, they were planted in 24-stool plots at Dodds for purposes of further multiplication, gumming disease resistance tests and minor selection.

(b) *Nobilisations.* These were seedlings selected from the experimental cross group in 1937. In all, there were 79. These also were multiplied at Codrington. In November, 1937, all were planted at Dodds in gumming disease resistance test plots. Further, a minor selection was made for a second season's test in Barbados. This resulted as follows:—

(i) thick-cane trial.
Standards—B.2935
—P.O.J.2878
} 32 seedlings

(ii) thin-cane trial.
Standard—Co.213 17 seedlings

(c) *Early Nobilisations.* In 1937, 29 early nobilisations were selected and planted in multiplication plots. In November, 1937, all were planted at Dodds in the gumming disease resistance test plots. Also, 18 were chosen and planted at Lion Castle for use as parents in further breeding work. Fourteen also were distributed for test as fodder canes.

(V) SECOND YEAR SEEDLING TRIALS.

(1) PLANT CANES—B.35′ SERIES.

Early and late group selections of the B.35′ series of noble cane seedlings were planted at Dodds (low rainfall), and Todds (high rainfall—early group) and Vaucluse (high rainfall—late group). The usual forms of lay-out and methods of obtaining data at crop were adopted.

In the early group, there were 30 seedlings. Of this number, six were selected for multiplication and further test. These are B.3509, B.3518, B.3520, B.3521, B.3525, B.3540.

Of the 23 seedlings in the late group one only was selected, i.e. B.3575.

(2) FIRST RATOONS—B.34′ SERIES.

These were reaped at Dodds and Todds as plant canes in 1937, and seven seedlings then selected. They were ratooned at Todds as an ordinary estate practice and in 1938, permission was given to cut and weigh the plots of the standards and the seven seedlings selected in 1937. Zeiss Hand Refractometer brix readings were made in each plot on an adequate sample of the plot canes. The results are given below.

TODDS 1937—1938.

Group	Seedling	Yield—tons per acre		Brix	
		Plant Canes 1937	First Ratoons 1938	Plant Canes 1937	First Ratoons 1938
Early ..	*B. 726	46.98	40.18	20.20	23.5
	*B.H.10(12) ..	40.66	41.15	19.27	23.7
	B. 3419	52.55	46.66	19.42	23.1
	B. 3429	47.17	38.23	19.95	23.0
	B. 3439	44.97	48.28	20.50	24.5
Late	*B.H.10(12) ..	43.09	42.76	22.0	23.6
	B. 3461	47.21	45.36	21.2	22.8
	B. 3464	61.04	48.40	20.4	20.4
	B. 3479	51.55	46.01	20.5	21.9
	B. 3482	49.86	37.91	21.2	22.7

From the above it can be seen that B.3419 and B.3439 are very promising seedlings. B.3464, while giving extraordinarily high cane yields, possesses very poor juice quality.

(VI) NOTE ON SEEDLINGS OF THE B.34′ SERIES (NOBLE CANES) AND B.35′ SERIES (NOBILISED CANES).

It should be noted here that B.3439, on account of its evident promise at an early stage, was promoted to select seedling trial stage in 1935 and is therefore, in stage of testing, ahead of the other selected seedlings in the B.34′ series.

* These denote standard commercial varieties.

The others, noted in the previous section, were planted in Select Seedling Trials and Maturity Experiments for season 1937-39. Also included in these trials are B.35187 and B.35245. These were selected from the Second Year Trial of *nobilised* seedlings reaped at Codrington in 1937. Normally, selections from this trial are for purposes of test as potential commercial canes in severe mosaic disease areas in Jamaica. The two noted above, however, did well enough in the second year trial in Barbados to warrant their further test in Barbados. These two seedlings represent the first of their kind to be taken to Select Seedling Trial stage in Barbados.

(VII) SELECT SEEDLING AND VARIETY TRIALS—B.31′, B.32′ AND B.33′ SERIES.

(A) THE SEEDLINGS TESTED.

(1) Select Seedling Trials.

Plant Canes	B.3013, B.3124, B.3127, B.3259, B.3267, B.3307, B.3327, B.3439.
1st Ratoons	B.3013.
2nd Ratoons	B.3124, B.3127.

(2) Variety Trials.

Plant Canes	B.3013, B.3127.
1st Ratoons	B.3013, B.3234.
2nd Ratoons	B.3013, B.3234.

(B) AN ECOLOGICAL CLASSIFICATION OF THE TRIALS.

This classification is similar to that used in last season's Report. The recognised areas are:—

A. Black and sandy coral limestone soils where average seasonal rainfall is low. On account of low rainfall, ratooning is difficult and tonnages are, as a rule, low.

Stations in this category are:—

(a) Select Seedling Trials.
Plant Canes .... Spencers.
Warleigh.
Bromefield.

(b) Variety Trials.
Plant Canes .... Haymans.
Mapps.
Fairy Valley.

B. Black coral limestone soils of low-intermediate rainfall. On account of a rainfall better than that of Category A, a certain amount of ratooning is practised. The extent of ratooning would increase, were stronger ratooning seedlings available.

Stations in this category were:—

(a) Select Seedling Trials.
Plant Canes .... Ridge.

(b) Select Seedling Trials.
Second Ratoons .... Lower Greys.

(c) Variety Trials.
Plant Canes .... Searles
Small Ridge.

C. Valley deep black coral limestone soil area, low-intermediate rainfall. This area may suffer at certain times from poor soil aeration. Soils, especially subsoils, tend to heavy texture, and root diseases are commonest here. Varieties resistant to the root disease complex are necessary here. A considerable percentage of this area is ratooned.

Stations in this category were:—

(a) Select Seedling Trials.
Plant Canes .... Bulkeley.

(b) Select Seedling Trials.
First Ratoons .... River
Bentley.

(c) Variety Trials.
Plant Canes .... Buttals
Carrington.

(d) Variety Trials.
First Ratoons .... Bulkeley.

D. Red coral limestone soil area, intermediate to high rainfall. One to four ratoon crops are grown here.

Stations in this category were:—

(a) Select Seedling Trials,
Plant Canes .... Drax Hall
Pool
Rock Hall.

(b) Select Seedling Trials,
Second Ratoons .... Lammings.

(c) Variety Trials,
Plant Canes .... Bakers
Andrews
Guinea
Hopewell
Locust Hall.

(d) Variety Trials,
First Ratoons .... Society
Cliff
Blowers
Clifton Hall
Claybury.

(e) Variety Trials,
Second Ratoons .... Ashbury
Clifton Hall
Farmers
Vaucluse
Kendal.

(c) RAINFALL DURING THE SEASON.

The average rainfall for 1937, derived from records of numerous plantations throughout the Island, was 54.20 inches. This is considerably below the average for the forty-year period 1890–1929, i.e., 60.87 inches. The shortage of rain during the effective growing period—June—October—is even more evident when it is noted that in 1937 an average of close on 10.00 inches was recorded for January, a figure three times the average for this month.

The monthly distribution of the rainfall effecting the 1938 crop is given below and is compared with an average of monthly rainfalls for the period 1920–37.

Month	Rainfall—Inches	
	1937—38	1920—37.
January	9.70	3.38
February	1.65	1.86
March	1.33	1.57
April	2.01	1.67
May	1.26	1.91
June	2.86	4.48
July	3.56	6.40
August	3.78	6.19
September	5.81	7.22
October	8.57	7.37
November	8.37	8.55
December	5.30	4.03
January	3.34	3.38
February	2.55	1.86
March	2.10	1.57
April	1.21	1.67
Totals	63.40	63.11

It can be seen that, for the season under review—1937/38, there was an excessively high January rainfall. This encouraged an unusual early development of the young plant cane stools. This was followed by a prolonged period of low rainfall which lasted almost to October. Conditions thereafter were practically normal. The prolonged low-rainfall period was excessively severe on the advanced young plant cane stools. These recovered slowly at first but quicker during October and after, and provided a reasonable crop where, at one time, they looked as if they might be a complete failure.

The ratoons were naturally not badly affected by this unusual rainfall distribution, and in many cases actually outyielded the plant canes.

With most growth occurring at the end of the season, juices were low, even at the beginning of a delayed reaping season. They improved rapidly, however, and were excellent from mid to late crop.

The late season growth was responsible for comparatively little rotten cane being seen during reaping.

From their growth types, the nature of the season may be said to have favoured relatively B.2935 in black soils and B.726 in red soils. In red soils, B.3013 was relatively badly hit by the prolonged low rainfall.

(D) RESULTS OF THE TRIALS.

In Select Seedling Plant Cane Trials, the following routine data is obtained:—(1) cane tonnage, (2) number of rotten canes, (3) complete cane chemical analyses from plot sample bundles, and so (4) calculation of the saccharose yields per acre. Statistical analyses of cane tonnages and sucrose per cent. in juice are made.

In Select Seedling Ratoon Trials, cane tonnages and number of rotten canes only are obtained.

Thus, for seedlings, comparative cane chemical analysis data are obtained in Select Seedling Plant Cane trials only and the figures obtained serve for approximating the saccharose yield of seedlings in Select Seedling Ratoon and Variety Trials.

The results are presented in a series of Figures (Figs. 1—V). The Figures present, for plant cane Select Seedling Trials, the calculated yield of saccharose per acre, and for Ratoon Select Seedling Trials and Variety Trials, the tonnage of cane per acre. The small lines alongside the two last named represent established significant differences in tonnages between seedlings.

The various categories are considered in turn:—

Category A. (*Fig. I*).

In this Category, three plant cane Select Seedling and three plant cane Variety Trials were reaped.

B.3127 and B.3267 are obviously quite unsuited to the low rainfall areas.

B.3124 and B.3307 were being tested as early seedlings only. Both yield slightly lower tonnages of cane than the standard—B.2935, but have better juice qualities so that, when reaped early, they approximate to B.2935 in yield of saccharose. Both, however, tend to lose cane weight rapidly and on this account their growth on a commercial scale is inadvisable. B. 3124 will be discarded, while B.3307 will no longer be planted in trials and its ratoon results awaited before making any further conclusions.

The conclusion for this Category is that B.2935 is so far the best variety. Attempts are being made to obtain an earlier ripening, sounder and stronger ratooning seedling for this category. For the 1937/39 season, the new seedling —B.3439—is being tested for this purpose in Variety Trials.

Category B. (*Fig. II*).

In this category, one plant cane, one second ratoon Select Seedling Trial and two plant cane Variety Trials were reaped.

The seedling B.3259 is quite inferior and will be discarded. B.3327 is also not up to standard. B.3267 gives good tonnages but inferior juice qualities and will be discarded. B.3124 is reasonably good in plant canes but indifferent in ratoons, and will be discarded. B.3013 yields approximately the same as B.726 and it is doubtful if it is worth replacing at all the latter by it.

The standard variety here is B.2935 and also a considerable amount of B.726 is planted for purposes of early reaping, and also on account of its stronger ratooning.

FIG I. CATEGORY A.

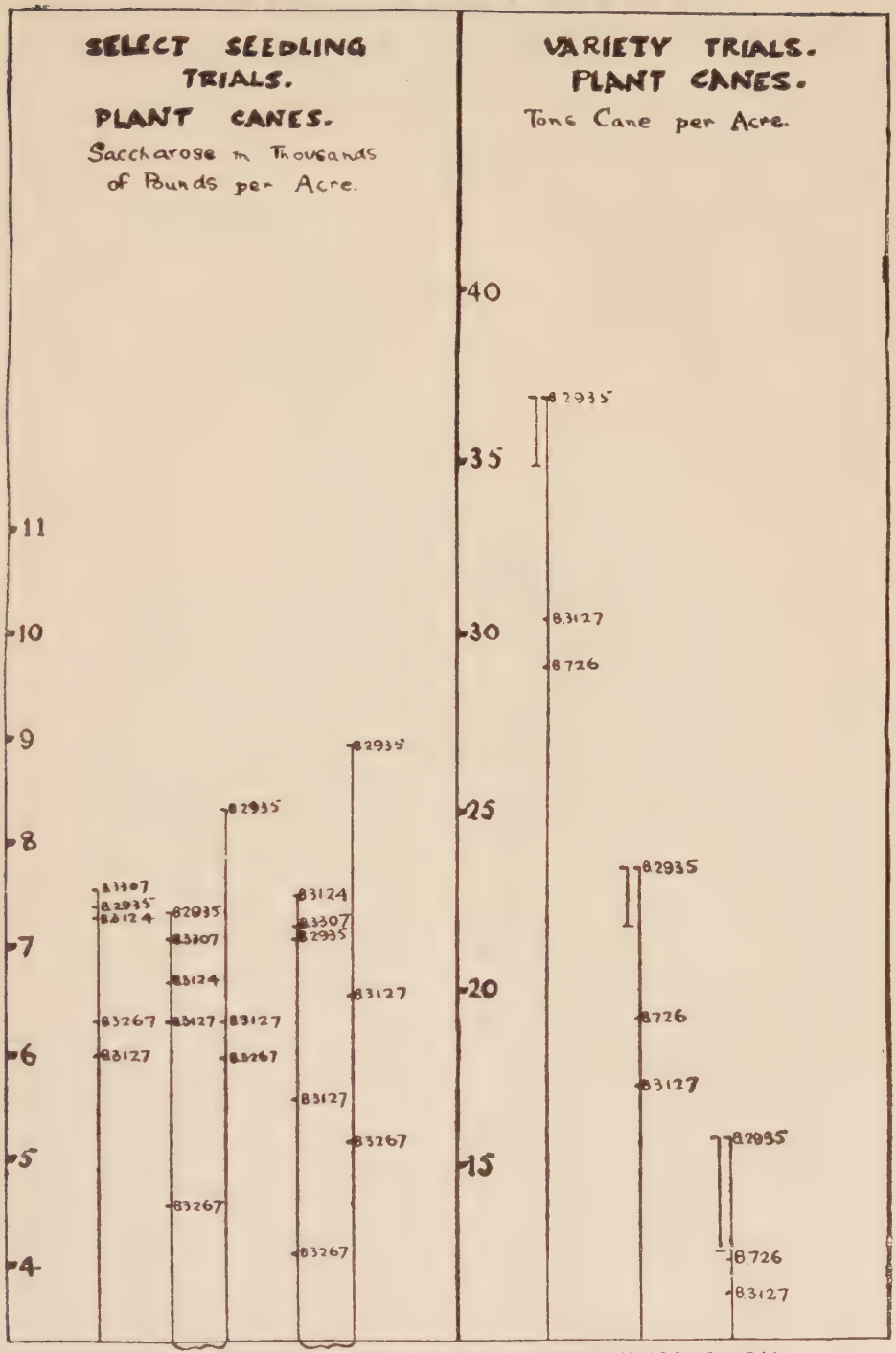

FIG II. CATEGORY B.

FIG III. CATEGORY C.

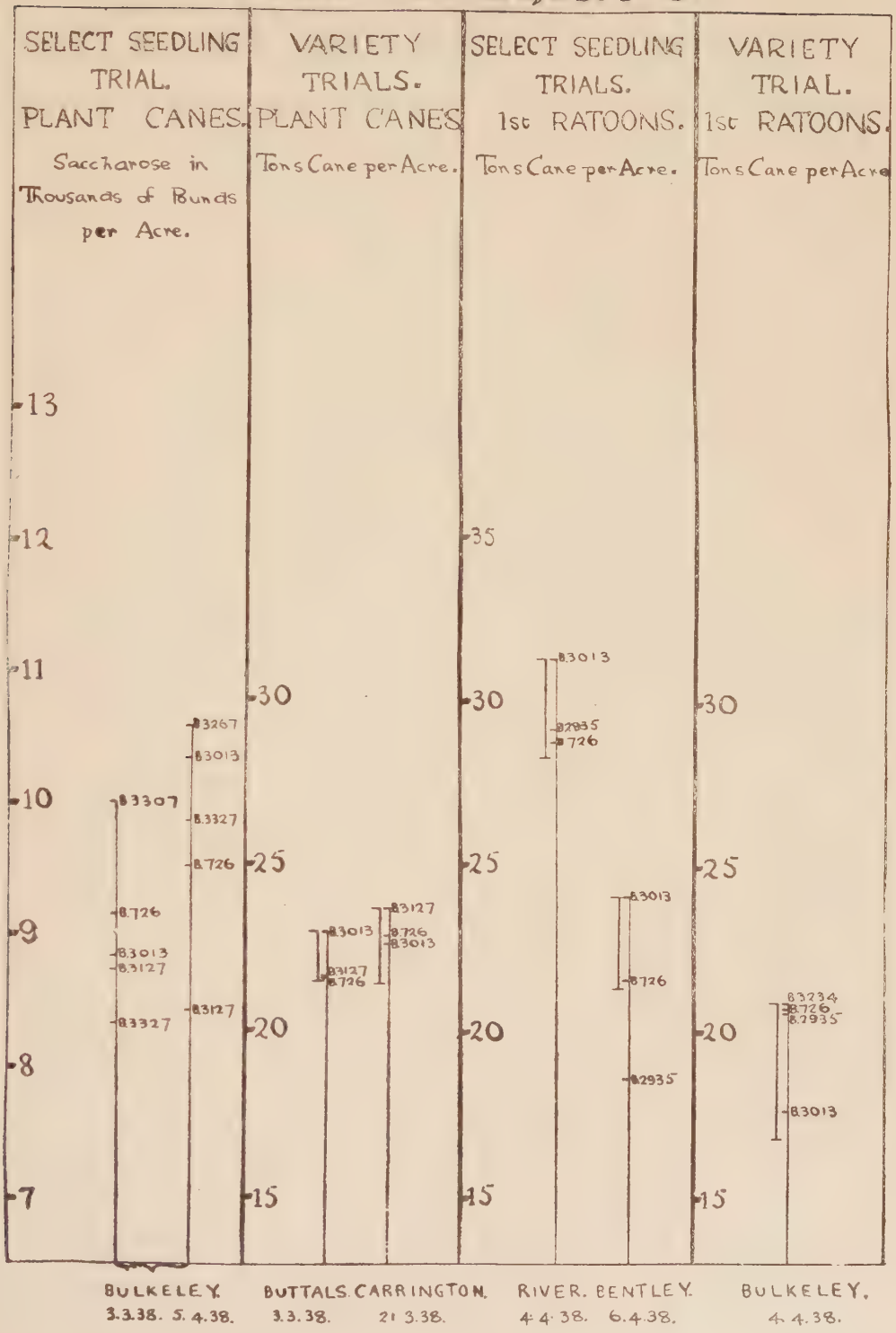

FIG IV. CATEGORY D.

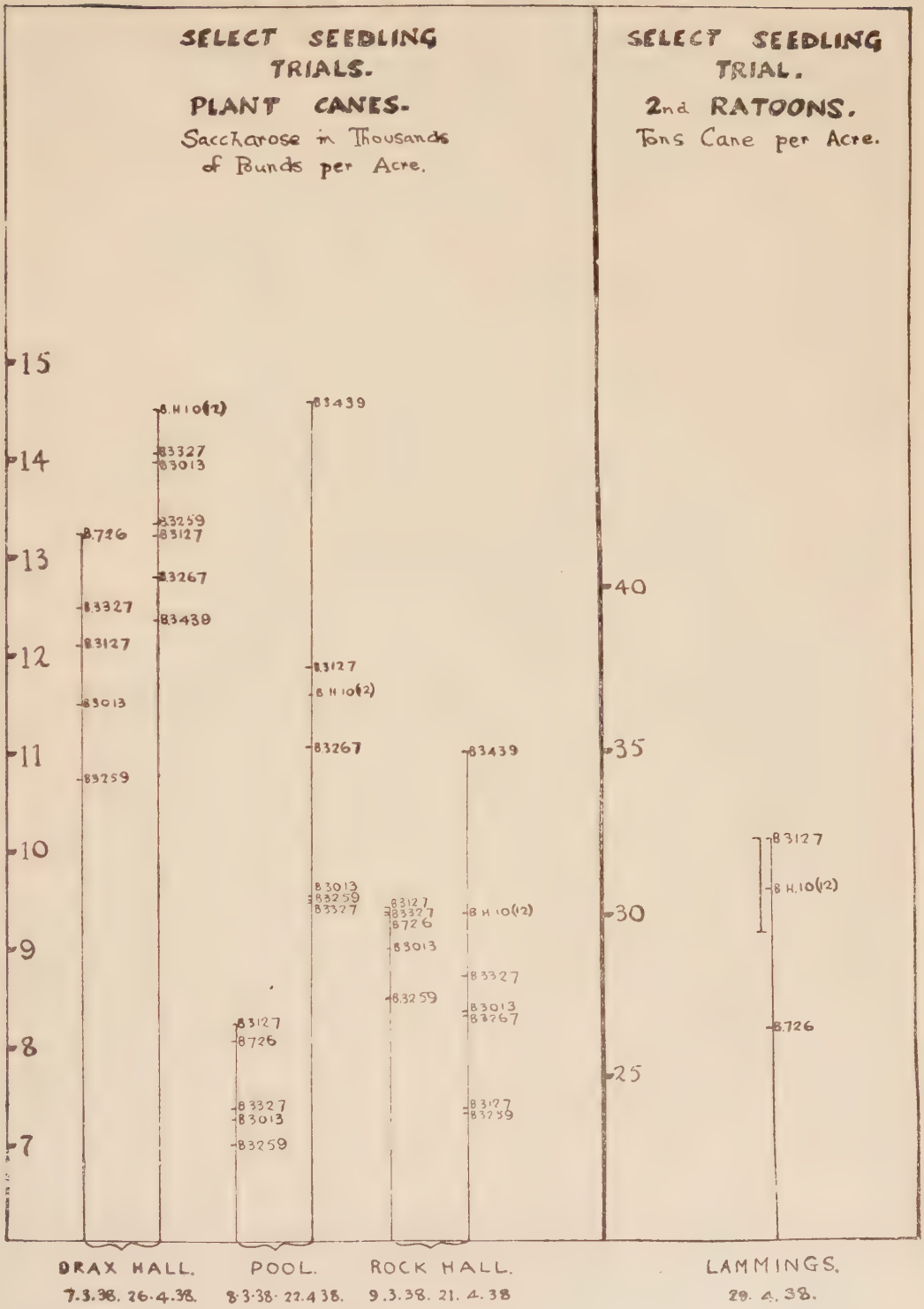

FIG V. CATEGORY D (concl).

The performances of B.3127 are thus very interesting. In plant canes, it tends to outyield B.726 and this superiority would seem to be more marked in ratoons.

B.3127 is a very hardy seedling, giving good plant cane and even better ratoon tonnages. It has excellent juice qualities and apparently strong ratooning powers. This seedling will be recommended this coming planting season to be planted on a small commercial scale on plantations within this Category.

B.3439, as in Category A, is being tested in Variety Trials in this Category for season 1937/39.

Category C. (*Fig III*).

One plant cane, one first ratoon Select Seedling and two plant cane and one first ratoon Variety Trials were reaped in this Category.

B.726 is the standard variety here.

B.3307 did well and will be further tested. B.3327 will not be further tested here. B.3267 did well at Bulkeley, but has a juice quality below the minimum expected of a standard variety. It will be discarded. The same applies to B.3234.

The yields of B.3013 in plant canes and ratoons are, as in the past, very variable. This season, in this Category, it has done very well on the whole, although in the early reaping of the plant cane Select Seedling Trial and in the first ratoon Variety Trial at Bulkeley, it was very indifferent. It is this unreliability which makes B.3013 a very doubtful commercial proposition in valley soils. The writer is inclined to the belief that B.3013 responds well in the better drained valley soils, but it is a failure in fields of heavy texture with poor drainage. In this respect, it would appear to resemble B.2935.

B.3127 did well as a plant cane at Buttals and Carrington, but poorly at Bulkeley. It is difficult to explain the result at the last-named place. In previous years, B.3127 has given excellent plant canes and ratoon yields in valley soils. It is evident that it should be further tested before making any definite conclusion on its value here.

The standard—B.726—is seen to perform consistently throughout and must still be regarded as the best all round variety for valley soils.

Category D. (*Figs. IV and V*).

Three plant cane Select Seedling, one second ratoon Select Seedling and five each of plant cane, first and second ratoon Variety Trials were reaped in this Category.

The seedlings of note only are considered here. B.3127 was in all trials, except the ratoon variety trials. In the plant cane Select Seedling Trials it yielded reasonably well. In the plant cane Variety Trials there was little to choose between it and the standards B.726 and B.H.10(12). As a plant cane and in red soils B.3127 would appear to yield about the same as the standards.

It was reaped in one ratoon trial only where it outyielded the standards.

It is probable that B.3127 may be commercially suited to the thinner types of red soils, chiefly on account of its seemingly strong ratooning powers in these conditions. Further tests are, however, necessary to prove this.

B.3013 occurred in all plant cane Select Seedling and all ratoon Variety Trials.

As a plant cane, it was inferior to the standards. As a ratoon, it was on the average better than the standards.

In last season's report it was stated *re* the performance of this seedling in red soils: "The conclusion is that B.3013 (as plant canes) in low rainfall years "will yield slightly less than the standards, while in average and especially "above average rainfall years, it will decidedly outyield the standards." And again, "It is as a *ratooner*, however, that B.3013 is remarkably superior to the "standards and this even in seasons of below average rainfall." These conclu-

sions appear to have been borne out in the trials under review which were grown during a season (1937/38) of below average rainfall.

One thing appears evident, and that is that B.3013 seems to prefer deeper, well-drained soils in good heart. Here it is certain it will outyield standards as plant canes, and especially ratoons in average and especially above average rainfall years. There can be no doubt that B.3013 is destined to be planted with advantage over a large percentage of the red soil acreage.

B.3234 was reaped in ratoon Variety Trials and gave high cane tonnages throughout. Its juice quality, however, is very poor, and on that account it is considered it would not outyield B.3013 in sugar yield per acre. It will not be recommended for commercial planting.

Of the remaining seedlings tested in this Category in Select Seedling Trials, B.3259 and B.3267 are definitely inferior and will be discarded. B.3327 has reasonable promise and will be further tested. B.3439 was outstanding at Pool and Rock Hall but poor at Drax Hall where its canes were beginning to become pithy. Its marked superiority at Pool and Rock Hall was undoubtedly due to the low rainfall adversely affecting the standards although suiting B.3439.

While B.3439 shows great promise for black soils, it is felt that it is of too short season a growth type to make full advantage of the normal long favourable growing season of the red soils. Under such circumstances, it will arrow very heavily and begin to get pithy during crop. Nevertheless, it is quite probable that it might be grown with advantage on poorer shallow red soils which tend to dry out rapidly—a condition which severely handicaps such varieties as B.726, B.H.10(12) and B.3013.

B.3439 is being and will be extensively tested throughout the Island, but especially in the black soils, i.e., in Categories A, B and C.

(E) NOTE ON PLANT CANE SELECT SEEDLING AND VARIETY TRIALS BEING CONDUCTED DURING THE 1937—39 SEASON.

Eight Select Seedling Trials were planted in 1937, two in Category A, two in Category B, one in Category C and three in Category D. These contain, in addition to the standards (B.2935, B.726, B.H.10(12), B.3013) the newer seedlings:—B.3307, B.3419, B.3429, B.3461, B.3464, B.3479, B.3482, B.35187, B.35245. Of this lot, B.3419 appears exceptionally promising for red soils. B.35187 and B.35245 are both seedlings which, although resembling noble canes in appearance, possess a certain amount of wild blood. This is the first occasion in which seedlings of such derivation have reached Select Seedling Trial stage, and their performances will be awaited with interest.

Sixteen Variety Trials were planted in 1937. Of these, six were planted in Category A to test B.3439 directly against B.2935, four in Category B, to test both B.3439 and B.3127 against the standards—B.2935 and B.726, two in Category C to test B.3439 and B.3127 against the standard B.726, and four in Category D to test B.3127 against the standards—B.726, B.H.10(12), B.3013.

(F) NOTE ON THE SEEDLING REQUIREMENTS OF BARBADOS.

During recent years, the chief requirement is an early ripening, strong ratooning seedling for the low rainfall black soil areas. As noted above, B.3439 is being tested for this purpose during season 1937/39.

(G) PLANTING RECOMMENDATIONS.

These will be issued as usual to each estate and smallholders' area prior to the coming planting season. Six varieties will be recommended—B.2935, B.726, B.H.10 (12), B.3013, B.3127, B.3439. It is the intention to recommend B.3127 for planting in one field only in plantations in Category B, while B.3439 will be recommended for planting two acres in each plantation in Categories A and B.

APPENDIX I.

SUGAR CANE BREEDING, SEEDLING RAISING AND FIELD NURSERY PLANTING, 1937—38. B. 40′ SERIES.

Details of Crosses made, their Germinations, Numbers Potted and Numbers Planted in Field Nursery.

Cross	Group	No. of Germinations. (Nov.-Dec. 1937)	No. Potted (Jan.-Feb. 1938)	No. Planted in Field Nursery (Oct. 1938)
	Proven Cross *Saccharum officinarum*			
Ba.11569 x B.H.10(12)		7,262	3,724	2,891
„ x B.603		710	460	396
„ x B. 417		182	103	55
„ x B. 6835		4,643	2,205	1,499
„ x Q. 813	Semi-Proven Cross *S. officinarum*	190	80	42
B. 3013 x B. 2935		1,127	709	391
„ x E. K. 28		0	0	0
B. 3439 x B.H.10(12)		364	156	125
		14,478	7,437	5,399
	Experimental Crosses— Nobilisations. (a) *S. spontaneum* (i) Celebes			
Toledo x B. 2935	2nd degree	9	0	0
B. 35197 x B. 2935	3rd degree	126	90	78
Ba.11569 x B. 35256	„ „	38	4	3
		173	94	81
	(ii) India			
B. 3013 x B. 35251	2nd degree	590	389	366

APPENDIX I.—(*Cont'd.*)

Cross	Group	No. of Germinations (Nov.-Dec. 1937)	No. Potted (Jan-Feb. 1938)	No. Planted In Field Nursery (Oct. 1938)
Ba.11569 x B. 35258	(iii) Java 3rd degree	7	4	3
B. 35261 x B. 2935	,, ,,	195	82	72
B. 35268 x B. 603	,, ,,	0	0	0
B. 35263 x B. 3013	,, ,,	0	0	0
B. 35260 x B. 2935	,, ,,	0	0	0
Ba.11569 x B. 35151	4th degree	8	0	0
B. 3013 x B. 3384	,, ,,	0	0	0
B. ,, x P.O.J.2878	,, ,,	13	9	0
B. ,, x B. 3337	,, ,,	920	656	614
B. 3274 x B.H.10(12)	,, ,,	431	131	79
M.D.47 x B.H.10(12)	,, ,,	525	430	425
B. 3392 x B. 603	,, ,,	135	100	82
B. 3013 x B. 34161	5th degree	188	118	101
,, x B. 35176	,, ,,	158	90	79
,, x B. 35237	,, ,,	7	0	0
,, x B. 34134	,, ,,	682	325	225
Ba.11569 x B. 34100	,, ,,	27	16	13
,, x M. 28	,, ,,	6	0	0
B. 3172 x B. 2935	,, ,,	839	455	265
B. 34105 x ,,	,, ,,	3	0	0
B. 3371 x ,,	,, ,,	160	108	72
B. 3215 x B.H.10(12)	,, ,,	10,039	3,915	2,736
B. 3238 x B. 2935	,, ,,	796	388	309
B. 35179 x B. 2935	,, ,,	0	0	0
B. 34137 x ,,	,, ,,	180	136	72
B. 3348 x ,,	,, ,,	161	132	109
		17,563	8,339	5,982

APPENDIX I.—(*Cont'd.*)

Cross	Group	No of Germinations. (Nov.-Dec. 1937)	No. Potted (Jan-Feb. 1938)	No. Planted in Field Nursery (Oct. 1938)
	(b) *S. barberi*			
B. 3013 x P.O.J.234	2nd degree	259	209	186
,, x B. 35245	3rd ,,	134	70	60
		393	279	246
	(c) *S. sinense*			
Uba x B.H.10(12)	1st degree	20	4	3
Merthi x B.H.10(12)	,, ,,	0	0	0
Kavangire x B.H.10(12)	,, ,,	5	5	5
B. 3013 x B. 35272	2nd degree	0	0	0
B. 35271 x B. 2935	,, ,,	0	0	0
Ba.11569 x B. 35275	,, ,,	0	0	0
C.H.64(21) x B.H.10(12)	,, ,,	4	4	1
		29	13	9
	(d) Mixed Derivation			
B. 3013 x B. 35221		21	0	0
,, x B. 35196		334	242	150
Ba.11569 x B. 35276		31	15	9
,, x B. 34160		49	15	8
,, x B. 34163		7	0	0
B. 35207 x B.H.10(12)		19	9	0
Co. 213 x P.O.J.2878		18	17	15
, x B. 603		83	80	79
B. 3365 x B. 2935		17	11	10
B. 3238 x B. 35253		3,271	2,115	1,939
B. 35218 x B.H.10(12)		0	0	0
Carried forward		3,850	2,504	2,210

APPENDIX I.—(*Cont'd.*)

Cross	Group	No. of Germinations (Nov-Dec. 1937)	No. Potted (Jan-Feb. 1938)	No. Planted in Field Nursery (Oct. 1938).
Brought forward	(d) Mixed derivation (*Cont'd*)	3,850	2,504	2,210
B. 3439 x Co. 290		763	434	328
„ x B. 37261		610	440	414
C.P. 807 x B. 3337		263	230	144
B. 35214 x B. 2935		0	0	0
		5,486	3,608	3,096
Grand Totals		38,708	20,159	15,179

APPENDIX II.

SUGAR CANE FIRST YEAR SEEDLINGS—B.39′ SERIES.

List of Crosses and Their Numbers of Seedlings Planted in the Field Nursery (April/May, 1937) and the First Year Seedling Trial (Oct./Nov., 1937).

Group	Cross		No. in Field Nursery	No. Planted in First Year Seedling Trial
Proven Crosses ..	Ba.11569	x B.H.10(12) ..	2,718	1,745
(*Saccharum officinarum*)	,,	x B.603 ..	1,733	607
	,,	x Ba.8069 ..	862	475
	,,	x B.417 ..	989	588
	,,	x B.6450 ..	529	150
	,,	x B.6835 ..	912	750
Semi-Proven Crosses	,,	x B.693 .	400	160
(*S. officinarum*)	,,	x Q.813 .	280	144
	Bourbon	x B.H.10(12) ..	450	0
	B.3013	x B.2935 .	710	363
	B.3138	x B.2935 ..	40	28
			9,623	5,010
Experimental Crosses Nobilisations				
(a) *S. spontaneum*, India 1st deg. ..	Ba.11569	x Dacca ..	76	51
2nd ,, ..	B.3013	x B.35250 ..	160	87
,, ,, ..	,,	x B.35251 ..	150	107
			386	245
(b) *S. spontaneum* Celebes 2nd deg.	Toledo	x S.C.12/4 ..	125	15
3rd ,,	B.35197	x B.603 ..	25	23
,, ,,	B.35204	x B.2935 .	160	100
,, ,,	B.35247	x B.603 ..	16	9
			326	147

APPENDIX II.—*(Cont'd.)*

Group	Cross	No. in Field Nursery	No. Planted in First Year Seedling Trial
(c) *S. spontaneum*, Java.			
2nd degree ..	Kassoer x B.2935 ..	9	0
3rd „ ..	B.35257 x B.2935 ..	50	31
„ „ ..	B.35261 x B.2935 ..	45	27
„ „ ..	B.35263 x B.2935 ..	40	19
„ „ ..	B.35268 x B.2935 ..	9	7
4th degree ..	B.3013 x P.O.J.2878 ..	370	228
„ „ ..	B(30)L6 x B.H.10(12) ..	150	92
„ „ ..	M.B.148 x B.2935 ..	130	85
„ „ ..	M.I.20 x B.6835 ..	112	68
„ „ ..	B.3274 x S.C.12/4 .	85	59
„ „ ..	B.3285 x B.H.10(12) ..	180	115
„ „ ..	Ba.11569 x B.3384 ..	50	31
„ „ ..	B.33101 x B.2935 ..	45	32
5th „ ..	B.3172 x B.2935 ..	142	83
„ „ ..	B.3215 x B.H.10(12) ..	190	108
„ „ ..	B.3238 x B.2935 ..	80	47
„ „ ..	B.3320 x B.603 ..	40	0
„ „ ..	B.3321 x B.H.10(12) ..	109	0
„ „ ..	B.3335 x B.2935 ..	30	19
„ „ ..	B.34102 x B.2935 ..	45	33
„ „ ..	B.34131 x B.603 ..	40	30
„ „ ..	B.35225 x B.2935 ..	40	29
„ „ ..	Ba.11569 x B.35224 ..	47	40
„ „ ..	Rock Hall x B.35176 ..	5	0
6th „ ..	B.35230 x B.603 ..	7	5
„ „ ..	B.35185 x B.2935 ..	95	59
		2,145	1,247

APPENDIX II.—*(Concluded).*

Group	Cross	No. in Field Nursery	No. Planted in First Year Seedling Trial.
(d) *S. barberi*			
2nd degree ..	Ba.11569 x P.O.J.234 ..	18	12
3rd „ ..	B.35211 x B.H.10(12) .	160	127
„ „ ..	B.3365 x B.2935 ..	162	129
4th „ ..	B.35206 x B.603 ..	180	0
		520	268
(e) *S. sinense*			
2nd degree ..	B.35271 x B.2935 ..	18	11
„ „ ..	Ba.11569 x B.35272 ..	4	4
„ „ ..	„ x B.35276 .	38	15
		60	30
(f) Mixed Derivation	B.3238 x B.35253 ..	180	131
	B.3321 x 35212 ..	65	0
	P.O.J.2725 x B.35243 ..	190	88
	B.3013 x B.35221 ..	160	120
	B.35218 x S.C.12/4 ..	90	59
	Ba.11569 x Co.290 ..	10	7
	M.D.47 x B.34116 ..	160	121
	B.3215 x B.35164 ..	12	7
	Ba.11569 x B.34160 ..	190	136
	P.O.J,2725 x Co.281 ..	166	174
	B.3368 x B.35236 ..	30	18
	P.O.J.2725 x B.34107 ..	170	73
		1,423	834
	(Ba.11569 x B.H.10(12) .. control	..	156
	Grand Totals	14,483	7,937

III. SPECIAL INVESTIGATIONS IN SUGAR CANE.

(i) GROWTH MEASUREMENTS.

During the season 1936-38, growth measurements were made in the following newer seedlings included in the plant cane Maturity Experiments:—B.3013, B.3127, B.3307, B.3327, B.3439. The standard varieties B.H.10(12) (high-rainfall district), B.726 (high and low-rainfall districts), and B.2935 (low-rainfall district), were included and measured for purposes of growth comparisons.

Growth measurements were also carried out on the following seedlings and standard varieties in the first ratoon Maturity Experiment in the high rainfall district:—B.H.10(12), B.726, B.3013, B.3267.

During the season 1937-39, growth measurements are being made in plant canes on the seedlings B.3419, B.3464, B.3479, B.35187, B.35245 at a low and a high rainfall station, while in first ratoons at a high rainfall station, B.3013, B.3127 and B.3439 are being measured. The standard varieties B.726, B.2935 and B.H.10(12) have been included at appropriate stations and are being measured for purposes of comparing the seedlings with them.

It is interesting to record that B.35187—a Java glagah nobilisation—and B.35245—a chunnee nobilisation are the first seedlings with "wild blood" to reach this stage of the seedling trial series in Barbados.

(ii) GUMMING DISEASE INVESTIGATIONS.

During the season 1937-39, routine gumming disease resistance tests were carried out at Dodds plantation.

These tests comprised a twenty-four cane hole plot of each of 112 noble cane seedlings and a three cane hole plot of each of 61 nobilised seedlings. Both the above tests serve (1) to eliminate susceptible types and (2) to furnish data on the inheritance of resistance to gumming disease.

(iii). INVESTIGATIONS WITH THE ZEISS HAND REFRACTOMETER.

This investigation represents a distinct line of research with the instrument, which has as its object the study of ripening phenomena in seedlings, using a precise sampling scheme for making Zeiss Hand Refractometer brix determinations.

Data obtained at the reaping of the Maturity Experiment plots at low rainfall and high rainfall stations in 1935 and 1937 were available. These have been studied, and the results published.*

A summary of the investigations is given here.

(1) Experiments carried out during the crop seasons of 1935 and 1937 to assess the value of the Zeiss Hand Refractometer in determination of rates of ripening in sugar cane seedlings are described.

(2) The data were obtained in "Maturity Experiments," in which Select Seedlings and standard varieties are reaped in replicated blocks, at each of three times during the crop season, at low rainfall and high rainfall stations.

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* McIntosh, A. E. S. and Stevenson, G. C.—Studies in the Use of the Zeiss Hand Refractometer; (3) The Zeiss Hand Refractometer as an Indicator of Ripening in Sugar Cane —B.W.I.C.S.C.B.S. Bull. No. 18, June 1938.

(3) The experimental methods involved a precise plot cane sampling scheme, and the taking of Zeiss Hand Refractometer readings at four positions in each selected cane.

(4) Top/bottom refractometer solids ratios were calculated and graphed for each seedling at each place, and for each time of reaping. Diagrams were also constructed to show the relationships between mean Zeiss Hand Refractometer brixes representative of the four cane quarters over the crop period. Analytical graphs, to show the effect of three arbitrary cane age-classes on Zeiss Hand Refractometer brix values were also drawn.

(5) Working from the hypothesis that ripeness is attained when the top/bottom refractometer solids ratio reaches unity, the experimental results are discussed with reference to the effect of season, place, cane age-class and variety on ripening.

(6) The deductions from the experimental results so obtained are compared with observed field phenomena and chemical data available from complete analyses made in connection with Select Seedling Trials over several crop seasons.

(7) It is concluded that the methods employed in this investigation for assessing degrees of ripeness and comparative ripening rates are reasonably accurate.

(8) The studies will be continued.

(iv) PRELIMINARY INVESTIGATIONS ON ROTTING OF CANE AND RATOONING OF SEEDLINGS.

In the Fourth Annual Report of the Station an outline was given of work started under this head during the 1937 crop. Further work on cane rotting was started during the 1938 crop, but was interrupted on the transfer of the Assistant Botanist to Mauritius.

This work will be recommenced on the appointment of a new Assistant Botanist.

(v) SUGAR CANE MOSAIC RESISTANCE TESTS.

Mosaic disease occurs throughout the British West Indies, though its effects are more serious commercially in some islands than in others. In Barbados it is controlled by an elaborate and expensive system of inspection and rogueing, but in certain regions this system is impracticable—particularly in parts of Jamaica, where the disease causes heavy losses in the susceptible noble canes, which are otherwise most suitable for these areas. On account of these considerations, the production of high yielding mosaic resistant seedlings of good quality, suited to West Indian growing conditions, is one of the major projects of this Station.

Prior to the institution of the tests described below, seedlings, whose parentage would indicate a reasonable chance of their possessing mosaic disease resistance and which had already undergone tests for yield and sucrose quality in Barbados, were sent through the Plant Quarantine Station in Trinidad for test under conditions of mosaic disease infestation in appropriate areas. The disadvantages of this scheme are obvious and in September 1937 a series of tests were started in Barbados, and it is intended that in the future only mosaic disease resistant selections will be further tested for yield and sucrose quality in Barbados and selections from these will be sent for trial to Jamaica and those islands where the disease is of considerable economic importance. The tests will also yield valuable information as to the inheritance of mosaic disease resistance which will be used to guide the breeding programme.

METHODS OF CONDUCTING MOSAIC DISEASE RESISTANCE TESTS.

I. Natural Infection Method.

This method consists of noting the behaviour of the seedlings in a special trial laid out in the field under conditions favourable for natural infection.

The test is laid out in single row plots of six stools and is arranged in the following way:—

1. Plot of seedling "A" to be tested.
2. Plot of a susceptible variety, planted with cuttings taken from mosaic infected stools.
3. Plot of seedling "B" to be tested.
4. Plot of maize—replanted at suitable intervals.
5. Plot of seedling "C" to be tested.
6. As in 2 and so on.

The plots are cut back at intervals when the canes are approximately four feet high. This facilitates the inspection of the stools and seems to favour the appearance of the disease. During dry weather the plots are irrigated.

Inspections are made at fortnightly intervals, and the appearance of leaf symptoms noted and entered in a table—Table I. When a seedling shows a minimum of three diseased stools, it is removed from the test and the plot replanted with another seedling which is to be tested. The test is thus a continuous one.

Seedlings which remain in the test for a period of fourteen to sixteen months without showing any symptoms of mosaic disease are considered to be commercially resistant.

Variety.	Parentage.	Date planted	Date Mosaic first seen	Number of Stools Infected. 1	2	3	4	5	6	Date removed.
B.3172	P.O.J.2725 x B.H.10(12)	13. 9.37								
B.3215	P.O.J.2725 x B.391	,,								
B.3254	P.O.J.2725 x B.417	,,								
B.34106	M.D.47 x B.H.10(12)	,,								
B.34120	Ba.11569 x M.B.3	,,	2.11.37		No record	of infection	n per hole	available.		9.12.37
B.34129	M.E.72 x B.2935	,,	21.12.37		Infected	Infected	Infected	Infected	Infected	14. 6.38
B.34130	Ba.11569 x M.D.11	,,	7.12.37	Infected			Infected	Infected	Infected	14. 6.38
B.34134	M.E.72 x B.2935	,,	2.11.37		No record	of infection	n per hole	available.		9.12.37
B.35151	B(30)L6 x B.H.10(12)	,,	16.11.37					8. 2.38		
B.35179	M.D.47 x B.H.10(12)	,,								
B.35187	B.3172 x B.391	,,								
B.3371	M.E.157 x B.H.10(12)	9.12.37								
B.34105	Ba.11569 x M.D.11	,,	8. 2.38	2.11.38	2.11.38	17.11.38	2.11.38	24. 8.38	8. 2.38	23.11.38
B.34110	M.I.20 x B.H.10(12)	,,								
B.34123	M.D.47 x B.H.10(12)	,,								
B.34137	P.O.J.2878 x B.H.10(12)	,,								
B.35176	B.3271 x B.374	,,	21. 9.38		2.11.38	17.11.38		21. 9.38	21. 9.38	23.11.38
B.35196	Ba.11569 x Co.281	,,	8. 6.38		3.11.38			8. 6.38	17.11.38	,,
B.35221	Ba.11569 x Co.290	,,	8. 6.38		17.11.38	8. 6.38	2.11.38	2.11.38	6.10.38	,,
B.35237	Ba.11569 x B.3280	,,	2.11.38		17.11.38	17.11.38	2.11.38	17.11.38	17.11.38	,,
B.35245	Ba.11569 x P.O.J.234	,,	17.11.38	17.11.38	17.11.38		17.11.38	17.11.38	17.11.38	,,
B.35270	Uba x B.H.10(12)	,,								
B.35275	Uba x B.H.10(12)	,,								
B.34117	P.O.J.2725 x Co.281	14. 6.38								
B.34163	Co.281 x B.H.10(12)	,,								
B.34104	Co.281 x B.H.10(12)	24.11.38								
B.3337	B.(30)L7 Selfed	,,								
B.35197	Toledo x S.C.12/4	,,								
B.35200	,, x ,, ...									
B.35204	,, x ,, ...	,,								
B.35247	,, x ,, ...	,,								

II. *Artificial Inoculation.*

The four methods of artificial inoculation which have been tested are as follows :—

(1) *The Sein Leaf-Slip Method.* A strip of mosaic diseased leaf, about six inches long by one inch wide, is wrapped tightly round the unrolled central leaf spindle of the shoot to be inoculated, and a bunch of very fine insect pins thrust repeatedly through the diseased leaf tissue into the tissues of the spindle. Using a bunch of fine pins, from seventy five to one hundred punctures are rapidly made, the object being to introduce infective juice into the healthy tissues with as little exposure to the air as possible.

(2) *The Matz Method.* A drop of juice extracted from diseased material is introduced into the cavity subtended between the last unfolded leaf and the central spindle of unrolled leaves. Through this juice a fine needle is thrust repeatedly into the healthy tissues of the shoot to be inoculated. For this method, juice obtained from mosaic diseased canes and from mosaic diseased shoots was used separately.

(3) *The Hypodermic Needle Method.* Infective juice obtained by crushing the diseased material is introduced by means of a hypodermic needle near the growing point of the shoot to be inoculated. Here again juice from diseased canes and diseased shoots was tested separately.

(4) *The Plug Method with Cuttings.* Single eye cuttings of healthy canes are used, and a plug of tissue is removed with a sterile 3/8″ cork borer as near as possible to the bud without damaging it. Into the cavity thus made, a plug cut from the leaf spindle of a diseased shoot with the same cork borer, is introduced, and crushed with a sterile glass rod. The original plug is then replaced, sealed with paraffin wax and the cutting planted and allowed to grow.

For the first three methods above, healthy plants of a susceptible noble cane variety growing in boxes were used. They were placed in a situation remote from any diseased canes so that the possibility of their becoming naturally infected was negligible. At the time of inoculation, the primary shoots were from one to two feet high and just beginning to tiller. The numbers of inoculations made by the various methods were as follows :—

Sein Method	16
Matz Method	17
Hypodermic Method	17
Plug Method	20

Symptoms of the disease were first seen on two plants inoculated by the Sein method, approximately five weeks after inoculation, and further cases of infection appeared up to twelve weeks after inoculation. By the plug method, cases of infection can be seen as soon as the first few green leaves have unrolled The results of the experiment were as follows :—

TABLE II.

	Inoculations	Infections	Percentage
Sein Method	16	8	50
Matz Method	17	0	0
Hypodermic Method	17	0	0
Plug Method	20	4	20

The results show that the Sein Method was by far the most successful. With the Plug Method only moderate success was obtained, and the other two Methods were failures.

Conclusions.

Both from the experience gained in Barbados and from work which has been carried out in Louisiana, much seems to depend on the technique employed in the Artificial Inoculation Method of testing for mosaic disease resistance, and the results when obtained are no more reliable than those obtained from the Natural Infection Method. Further, recent work in Queensland has shown that cane varieties which are resistant under field conditions to mosaic disease, may succumb to the disease when artificially inoculated. In view of these points and the simplicity with which the Natural Infection Method may be operated, it has been decided to discontinue further work on the Artificial Inoculation Method and to extend the Natural Infection test so as to include a greater number of seedlings.

It must be stated here that, since there is a possibility that the mosaic disease present in Jamaica and the other areas served by the Station is of a different strain to that present in Barbados, it does not follow that because a seedling has shown itself to be commercially resistant to mosaic disease in Barbados, it will also be resistant in Jamaica and the other areas. Therefore, every effort should be made to institute in those areas, a series of natural infection mosaic disease resistance tests similar to that now in progress in Barbados. In this way, the reaction of parallel series of seedlings in Barbados and in Jamaica may be compared and conclusions reached as to the value to Jamaica of the tests in Barbados.

IV. MISCELLANEOUS.

(i) VISITS.

During the period under review the Geneticist visited Trinidad to attend the seventh meeting of the Advisory Committee. At the same time the opportunity was taken to visit multiplication plots on estates to note the growth of seedlings recently liberated from quarantine and to advise on their allocation in future trials.

(ii) DESPATCH OF SEEDLINGS.

During the season under review, cuttings of sixteen seedlings were sent to the Plant Quarantine Station in Trinidad to undergo quarantine prior to being sent to the contributing colonies.

These may be classified as follows:—

(a) Thick noble-cane seedlings for testing in better soil conditions where mosaic disease is absent or can be controlled:—B.3327, B.3419, B.3429, B.3461, B.3464, B.3479, B.3482, B.3509, B.3518, B.3520, B.3521, B.3525, B.3540, B.3575—14.

(b) Thinner cane nobilised seedlings for testing in Uba, Co.213 and P.O.J.2727 areas in Trinidad, Jamaica and Antigua—B.35214, B.35245—2.

(iii) ADVISORY WORK.

During the year, the quarantine period of several seedlings terminated and, in accordance with Resolution 95 of the Advisory Committee, the Station advised the Plant Quarantine Station on the allocation of these seedlings among the contributing colonies. At the same time, descriptive notes on each released seedling were sent to the appropriate colonies with a view to guiding subsequent testing.

V. PUBLICATIONS ISSUED.

(a) ANNUAL REPORTS.

(1) Report for the Period ending September 30, 1934.
(2) Report for the Year ending September 30, 1935.
(3) Third Annual Report ending September 30, 1936.
(4) Fourth Annual Report ending September 30, 1937.

(b) BULLETINS.

(5) Bulletin 1—Report on the Sugar Cane Breeding Problems of Antigua, Trinidad and St. Kitts—A. E. S. McIntosh, September, 1933.
(6) Bulletin 2—Report on the Sugar Cane Variety Problems in St. Lucia—A. E. S. McIntosh, June, 1934.
(7) Bulletin 3—Report on a Visit to Jamaica—A. E. S. McIntosh. Sept., 1934.
(8) Bulletin 4—Report on a Visit to Grenada—A. E. S. McIntosh, November, 1934.
(9) Bulletin 5—Investigations into the Root Development of the Sugar Cane in Barbados (1). Root Development in Several Varieties under one Environment—G. C. Stevenson and A. E. S. McIntosh, Feby., 1935.
(10) Bulletin 6—An Account of the Policy and Methods employed in the Breeding and Initial Stage of Selecting Sugar Cane Seedlings—A. E. S. McIntosh, June, 1935.
(11) Bulletin 7—Report on a Second Visit to Antigua—A. E. S. McIntosh, July, 1935.
(12) Bulletin 8—Gumming Disease Investigations in Barbados—A. E. S. McIntosh and G. C. Stevenson, August, 1935.
(13) Bulletin 9—An Account of the Methods employed in Testing and Selecting Sugar Cane Seedlings for Thick-Cane Areas in the British West Indies—A. E. S. McIntosh.
An Account of the Methods Employed in Carrying out Sugar Cane Seedlings and Variety Trials in Barbados —A. E. S. McIntosh and C. B. Foster, Sept. 1935.
(14) Bulletin 10—The Yield of Sugar Cane in Barbados in 1936—August, 1936.
(15) Bulletin 11—Investigations into the Root Development of the Sugar Cane in Barbados (2). Further Observations on Root Development in Several Varieties under one Environment.—G. C. Stevenson, August, 1936.
(16) Bulletin 12—Sugar Cane Fuzz Storage Experiments—A. E. S. McIntosh, April, 1937.
(17) Bulletin 13—Report on a Second Visit to Grenada, April, 1937—A. E. S. McIntosh, June, 1937.
(18) Bulletin 14—A Botanical and Agricultural Description of Recently Produced Commercial Seedlings—A. E. S. McIntosh, June, 1937.
(19) Bulletin 15—Report on a Visit to St. Kitts and Antigua, June, 1937 —A. E. S. McIntosh, July, 1937.

(20) Bulletin 16—(1) Studies on Gumming Disease of Sugar Cane. (2) Investigations into the use of the Zeiss Hand Refractometer—G. C. Stevenson—July, 1937.

(21) Bulletin 17—The Yield of Sugar Cane in Barbados in 1937—August, 1937.

(22) Bulletin 18—Studies in the use of the Zeiss Hand Refractometer (3) The Zeiss Hand Refractometer as an Indicator of Ripening in Sugar Cane—A. E. S. McIntosh and G. C. Stevenson. June, 1938.

VI. STATEMENT OF EXPENDITURE FOR 1937-38.

		£	s.	d.
1.	Personal Emoluments	871	6	11
2.	Personal Allowance to Geneticist	100	0	0
3.	Clerical Assistance	50	0	0
4.	Provident Fund	42	10	0
5.	Seedling Trials	399	11	5
6.	Stationery and Publications	38	14	6
7.	Travelling	288	17	3
8.	Contingencies	15	3	9
	Total	1,806	3	10